DOCUMENT RESUME

ED 045 766 UD 011 082

AUTHOR Ward, William C.; And Others
TITLE Motivation and Capacity in Children's Creativity. Research Bulletin.
INSTITUTION Educational Testing Service, Princeton, N.J.
REPORT NO RB-70-39
PUB DATE Jun 70
NOTE 13p.

EDRS PRICE EDRS Price MF-$0.25 HC-$0.75
DESCRIPTORS Aptitude, Creative Expression, *Creativity, Divergent Thinking, *Elementary School Students, Individual Differences, *Lower Class, *Motivation, *Negro Youth, Productive Thinking, Psychoeducational Processes, Rewards, Socioeconomic Status, Task Performance, Urban Youth

ABSTRACT

An attempt was made to distinguish between capacity and motivational interpretations of individual differences in children's creativity. Creativity tasks required the child to name as many ideas as he could that met a simple problem requirement. Tasks were given under "base line" conditions and with a reward of one cent for each idea given. If task motivation is the critical determinant of performance, reward should decrease the differences between high and low scorers by decreasing the range of motivation with which the task is approached. However, if these individual differences reflect capacity, reward should increase or leave unchanged the difference in number of ideas given by more and less fluent children. Reward led to an increase in mean number of ideas which was consistent across levels of creativity. Thus, while motivating conditions may alter the level at which the group performs, the data suggest that individual differences in performance derive from differences in capacity rather than motivation for divergent ideational production. (Author/JM)

EDO 45766

RESEARCH BULLETIN

RB-70-39

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION
THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL OFFICE OF EDUCATION POSITION OR POLICY.

MOTIVATION AND CAPACITY IN CHILDREN'S CREATIVITY

William C. Ward, Nathan Kogan
Educational Testing Service
and
Ethel Pankove
Montgomery Township, N. J., Public Schools

ED011082

PERMISSION TO REPRODUCE THIS COPYRIGHTED MATERIAL HAS BEEN GRANTED BY William C. Ward, N. Kogan, & Ethel Pankove
TO ERIC AND ORGANIZATIONS OPERATING UNDER AGREEMENTS WITH THE U.S. OFFICE OF EDUCATION. FURTHER REPRODUCTION OUTSIDE THE ERIC SYSTEM REQUIRES PERMISSION OF THE COPYRIGHT OWNER

This Bulletin is a draft for interoffice circulation. Corrections and suggestions for revision are solicited. The Bulletin should not be cited as a reference without the specific permission of the authors. It is automatically superseded upon formal publication of the material.

Educational Testing Service
Princeton, New Jersey
June 1970

ED0 45766

MOTIVATION AND CAPACITY IN CHILDREN'S CREATIVITY

William C. Ward, Nathan Kogan
Educational Testing Service

and

Ethel Pankove
Montgomery Township, N. J., Public Schools

Abstract

An attempt was made to distinguish between capacity and motivational interpretations of individual differences in children's creativity. Creativity tasks required the child to name as many ideas as he could that met a simple problem requirement. Tasks were given under "base line" conditions and with a reward of one cent for each idea given. If task motivation is the critical determinant of performance, reward should decrease the differences between high and low scorers by decreasing the range of motivation with which the task is approached. However, if these individual differences reflect capacity, reward should increase or leave unchanged the difference in number of ideas given by more and less fluent children.

Reward led to an increase in mean number of ideas which was consistent across levels of creativity. Thus, while motivating conditions may alter the level at which the group performs, the data suggest that individual differences in performance derive from differences in capacity rather than motivation for divergent ideational production.

MOTIVATION AND CAPACITY IN CHILDREN'S CREATIVITY[1]

William C. Ward, Nathan Kogan[2]
Educational Testing Service

and

Ethel Pankove
Montgomery Township, N. J., Public Schools

The present study explores the effects of a concrete reward on children's creativity. The tasks employed--those introduced by Wallach and Kogan (1965)--require the child to name as many ideas as he can that meet a simple problem requirement; for example, to name uses for an object, or interpretations of an abstract line drawing. With subjects from early elementary (Ward, 1968) to college age (Wallach & Wing, 1969), these tasks are substantially intercorrelated and show little relation to conventional measures of intellectual ability. Thus, it is clear that they measure a coherent dimension of individual differences. There is still considerable uncertainty, however, concerning the processes responsible for these differences. On the one hand, children who produce more ideas may differ in capacity from those who produce fewer; for example, their "associative hierarchies" (Mednick, 1962) may be larger and more richly interconnected. Alternatively, the differences may be found in motivational variables--the productive child may be the one who is more intrigued by an unusual problem (Wallach & Kogan, 1965), or he may simply have a greater desire to please the examiner (Cronbach, 1968).

The study of incentive effects on creativity test performance provides one way to distinguish between these explanations. Reward is intended to assure, so far as is possible, that subjects will approach the situation with uniformly high task motivation. Then, if the variation in ideational production observed under ordinary testing conditions represents differences

in effort expended, reward should eliminate, or at the least reduce, the magnitude of those differences. If, instead, variation in productivity primarily represents capacity, increased motivation should not help the child who lacks relevant associations to draw closer to one with a larger repertoire.

A simple incentive--one cent for each idea given--seemed appropriate for our sample of lower-SES fifth-grade children. In pilot work such a reward engendered a high level of enthusiasm. Although the incentive may not have produced an equally high level of involvement for each child, one can safely claim a substantial reduction in the range of motivation with which the task was approached.

Method

Subjects were fifth-grade children, 95 males and 96 females. The sample was predominantly urban, black, and of lower socioeconomic status. Children averaged 133.3 months of age (S.D. = 5.4) and had mean Kuhlman-Anderson IQ scores of 94.0 (S.D. = 11.5).

Four creativity tasks, two with semantic and two with figural content, were employed. Each was a four-item modification of a task used by Wallach and Kogan (1965): Children were asked to name uses for objects, similarities between pairs of objects, and possible interpretations for simple abstract patterns and for line drawings.

As in earlier investigations, the tasks were administered individually, without time limits, in a testing atmosphere offering ample encouragement and praise. Session 1 provided a base line measure of creativity for all subjects. In Session 2, one third of the children of each sex were assigned

randomly to each of three treatments. Control children received a repetition of base line testing conditions. Subjects in the Immediate Reward group were told that they would receive a penny for each idea. Rewards were dispensed as the subjects responded, and were given without regard for the appropriateness of the idea. Finally, subjects in the Delayed Reward group were given pennies when the task was completed; this condition controlled against a possible distracting effect of the pile of pennies accumulating before the child.

Task orders were counterbalanced within and between sessions. Each child received one task with semantic and one with figural content in each session.[3] All base line testing and Session 2 for the Control group were completed before any children were aware of the possibility of receiving rewards.

Results

Each child's protocols were scored by one of two judges for fluency--the total number of ideas given, less those few judged to be repetitious or inappropriate. A reliability check yielded interjudge correlations ranging from .82 to .98 for the four tasks, with an average correlation of .94. Because the distributions were positively skewed, fluency scores were subjected to a logarithmic transformation; they were then converted to standardized T-scores with $M = 50$ and $S.D. = 10$ for base line performance on each task.

The majority of studies on children's creativity have employed subjects who are white, middle class, and above average in intelligence test performance. It is therefore of interest to note that the creativity

dimension appears as strongly in the present sample as in earlier work. For the 64 children in the Control group, who were given all four tasks under standard conditions, fluency scores showed intercorrelations ranging from .44 to .79, with an average correlation of .66 ($p < .001$). IQ scores were available for 52 of these subjects; they correlated with creativity from -.01 to .11 for the four tasks, with an average correlation of .05.

Four 3 x 2 x 2 analyses of variance were performed, searching for treatment group, sex, and order effects in the base line data for each task. No sex differences or order effects were found, but there was a significant group effect for subjects whose base line assessment required naming similarities and interpreting line drawings ($F = 4.14$ for Similarities and 4.26 for Line Drawings; $df = 2,83$; $p < .025$). Subjects who received the Delayed Reward treatment in Session 2 gave fewer responses in base line assessment than did subjects who received the other treatments.

Incentive effects are presented in Table 1 and in Figure 1. Table 1 provides for each treatment group the raw score means and standard deviations

---

Insert Table 1 about here

---

on each task and for all four tasks combined. In Figure 1, the regression

---

Insert Figure 1 about here

---

of Session 2 scores on base line creativity is shown for each treatment group, with data from the four tasks combined. Only one of the tasks in Session 1 was used to provide a base line measure for each subject--the base line task with semantic content for subjects who received a semantic task in

Session 2, and the base line task with figural content for those whose incentive treatment involved a figural task.

The slopes of the regression lines in Figure 1 are of primary interest. If a motivational interpretation of the creativity dimension is correct, reward should reduce or eliminate base line differences between children, producing a flatter slope for reward groups than for Control children. It is evident in Figure 1 that the three groups show similar relations between base line and reward conditions; the slopes are .61 for Delayed Reward, .69 for Controls, and .81 for Immediate Reward, and do not differ significantly from one another ($F = 0.63$, $df = 2,185$). Rather, reward has an overall effect on the mean level of performance; analysis of covariance yields an F of 23.05 ($df = 2,187$) which is significant at the .001 level. Both Immediate and Delayed Reward result in increased mean numbers of ideas relative to the Control group ($F = 38.92$ and 28.28, respectively; $df = 1,187$; $p < .001$), while Immediate and Delayed Reward do not differ in their effect ($F = 0.89$).

The results above were obtained for all four creativity tasks combined. Analyses were also performed separately for each task, showing in each case a nonsignificant effect for slope ($F \leq 1.97$, $df = 2,41$) and a significant effect for treatments ($F \geq 3.93$, $df = 2,44$, $p < .05$). Children receiving Immediate Reward gave significantly more ideas than did Control children on each of the four tasks, while those receiving Delayed Reward did so on three of the tasks.[4]

Discussion

It has been demonstrated in this study that the creativity dimension is present in elementary school children of lower socioeconomic status; that

the level at which groups of children perform on the task is raised by providing a concrete incentive; and that the relative ordering of individuals is stable over such a variation in administration conditions.

The relevance of these data to the capacity vs. motivation interpretation of creativity depends on several assumptions. First, it is assumed that the extrinsic motivator provided for the reward groups acted to increase the subjects' desire to produce many ideas, raising this desire to approximately its optimum value--that is, to the level most conducive to high ideational production. Second, it is assumed that this increase was greater for those subjects who under base line testing conditions were low on ideational production than for subjects who were high. In reward conditions, those subjects who were initially low on task motivation are assumed to have had their motivation enhanced to a point where it either equalled or approached that of subjects who were initially high on task motivation. If these assumptions are reasonable, and if the critical determinant of individual differences in performance on creativity tasks is the child's desire to perform well, reward groups should have shown at least a decrease in the slope of the function relating base line and rewarded performance. As no such decrease was forthcoming, the data provide support for the alternative explanation that differences in the capacity for divergent ideational production are reflected in the individual variation obtained under ordinary testing conditions.

It should be noted that these results were obtained using a fluency score to represent the creativity dimension. Other scoring procedures--for example a scoring for originality of ideas--are possible, and it remains to be seen whether similar results will be obtained when the criterion is changed in this way.

References

Cronbach, L. J. Intelligence? Creativity? A parsimonious reinterpretation of the Wallach-Kogan data. American Educational Research Journal, 1968, 5, 491-511.

Mednick, S. A. The associative basis of the creative process. Psychological Review, 1962, 69, 220-232.

Wallach, M. A., & Kogan, N. Modes of thinking in young children: A study of the creativity-intelligence distinction. New York: Holt, Rinehart & Winston, 1965.

Wallach, M. A., & Wing, C. W., Jr. The talented student: A validation of the creativity-intelligence distinction. New York: Holt, Rinehart & Winston, 1969.

Ward, W. C. Creativity in young children. Child Development, 1968, 39, 737-754.

Footnotes

[1]This paper is to be presented in slightly altered form at the 1970 meetings of the American Psychological Association. The study was supported by Research Grant 1 P01 HD01762 by the National Institute of Child Health and Human Development to Educational Testing Service. Appreciation is owed to the personnel of the public school system of Oakland, California, for their cooperation; to Doris Maslach and David Ramirez for collecting the data; to Diane Feltzin, Henrietta Gallagher, and Patricia Warren for assistance in scoring and analysis, and to Harvey Baker, Geoffrey Beall, Walter Emmerich and Norman Frederiksen for their critical reviews of this report.

[2]Now with the Graduate Faculty, New School for Social Research.

[3]In Session 2 only the first task given involved the manipulation described. In the final task subjects in the Immediate and Delayed Reward groups were offered pennies for "good" ideas. No incentive effect was found in this condition when rewarded groups were compared with Control children; however, this treatment was confounded with the major incentive manipulation described and will not be considered further. Only data from the first task given in Session 2 are reported.

[4]The analysis of covariance may be questioned when there are treatment group differences in the covariate. Therefore the five analyses (one for each task and one for the four tasks combined) were repeated, using data only from the two groups--Immediate Reward and Control--which did not show significant differences in base line creativity scores for any of the tasks. In each analysis there was a nonsignificant F for slope differences and a significant effect of incentives on the mean number of ideas given.

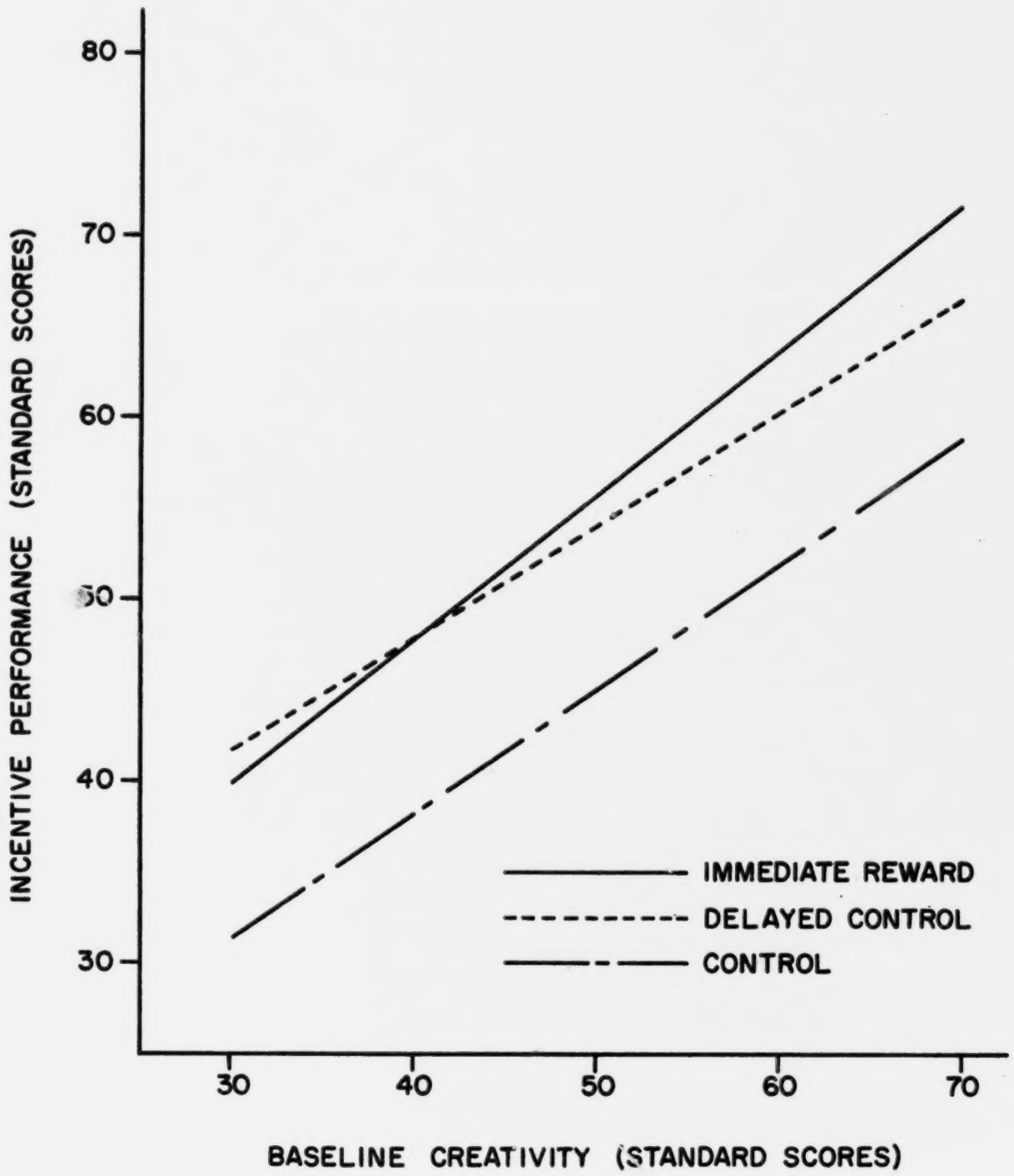
Table 1

Creativity Means and Standard Deviations for the Three Treatment Groups

		Task				
Treatment Group		Similar-ities	Line Drawings	Uses	Patterns	All Tasks
Immediate Reward	Mean	61.88	57.63	55.07	53.06	56.94
	S.D.	16.85	11.95	10.76	5.92	12.21
Delayed Reward	Mean	54.06	55.69	51.94	48.19	52.47
	S.D.	13.57	6.99	9.18	4.96	9.45
Control	Mean	35.48	51.13	47.13	49.25	45.73
	S.D.	19.51	12.40	7.13	3.87	13.45

Figure Caption

Fig. 1. Regression of incentive performance on base line creativity.


INCENTIVE PERFORMANCE (STANDARD SCORES)
80
70
60
50
40
30
30
40
50
60
70
BASELINE CREATIVITY (STANDARD SCORES)
IMMEDIATE REWARD
DELAYED CONTROL
CONTROL